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ON THE RANGE OF THE DORMOUSE IN ENGLAND AND WALES.

By G. T. ROPE.

IN the following pages an attempt has been made to arrange the numerous notes relating to this subject, which appeared at intervals in the Natural History columns of 'The Field' last year, in a more compact form, and one more convenient for reference; in addition to which I have been enabled, through the kindness of several well-known naturalists, resident in various parts of England and Wales, to add the result of their valuable observations, obligingly communicated by letter.

The Dormouse being, from the nature of its food and habits, essentially a dweller in woods, thickets, and plantations, is consequently most numerous in well-wooded districts, its comparative abundance or scarcity being regulated perhaps as much by the character of the country in this respect as by climatic influences. A marked scarcity of this little rodent is observable in the two most easterly counties of England, *viz.*, Norfolk and Suffolk, and apparently the same may be said of a great part of Lincolnshire, its presence having been detected, as far as I am aware, only in a few isolated spots. This it seems hard to account for, unless occasioned by the cold and cutting east winds to which that part of the country is exposed. Yet the occurrence of the species much further north, as in East Yorkshire and Durham, seems to refute that supposition; possibly a thorough search in likely-looking spots might, in some cases, reveal the hitherto unsuspected presence of this shy and



retiring little creature. The large area occupied by the "fen country" would, it need hardly be observed, be for the most part ill adapted to its habits. As might be supposed, some slight variation has been observed in the habits of dormice, occasioned by the natural features, &c., of the district they inhabit. Beech and oak woods and hazel copses seem to have great attractions for them. Captain Hadfield informed me that in the Isle of Wight their nests were frequently found by a friend in ivy, growing on rocks and the trunks of trees, and also in old ricks. In a letter which appeared in 'The Field' (April 19th, 1884), signed J. B. R., the writer, speaking of the habits of this animal in Oxfordshire, says—"They are found mostly in the vicinity of the parasite 'Old Man's Beard,' with which they line their nests before laying up for the winter. . . . They are fond of daisy seed." The nest of the Dormouse has been found in furze, thorn, and various other bushes, in laurel and other evergreens, in hedges, and even on the ground, two instances of which are given in a letter received from Mr. J. Gatcombe, of Plymouth, the first mentioned nest having been found near Plymouth by a friend of the writer, Mr. T. A. Briggs, the other by Mr. Bignall in Cann Wood, near the same town. Mr. Briggs on one occasion discovered two old dormice in one nest; this, however, appears to be quite an exceptional occurrence.

From the following particulars it may be gathered that this species is distributed in more or less abundance throughout the southern, western, and midland counties, and is found in some parts of Wales, as well as in a few suitable localities in the counties north of Yorkshire.

To begin with the south-western corner of our island, taking CORNWALL as a starting-point from whence to trace the distribution of this species northwards, we find the following editorial note referring to that county, occurring in 'The Field' (May 3rd, 1884):—"Couch in his 'Cornish Fauna,' Bullmore, and Cocks in his 'Fauna of Falmouth,' all testify to this little animal being found in Cornwall, where, in particular localities, it is said to be not uncommon," a statement since confirmed by Mr. Gatcombe.

From DEVONSHIRE there is abundant evidence of its occurrence in many parts of the county. Mr. J. J. Phillips reports it as very common at Morebath, on the borders of Somersetshire. Near the south coast both Mr. D'Urban and Mr. Gatcombe consider it

not uncommon in the woods near Plymouth ; and the Rev. G. C. Green finds it also far from rare about Modbury. Mr. D'Urban mentions its occurrence in the neighbourhood of Axminster. Mr. Gatcombe also states that it is common in some places near Exeter, but that he believes it to be scarcer than it formerly was in South Devon. He says—"Bellamy, in his 'Natural History of South Devon,' speaks of it as 'not uncommon, perhaps commoner than in most counties.'" Mr. J. Brooking Rowe, one of the revisers of Couch's 'Cornish Fauna,' lately told Mr. Gatcombe that he also considered the species to be less frequently met with in the south of the county than in former years. Miss Henchcliff informs me that it occurs about Instow and Westward Ho ; and Mr. A. L. Allen mentions the neighbourhood of Honiton as a locality where he has caught specimens and found the animal fairly common. ('Field,' April 19th, 1884).

Reports from DORSETSHIRE and HAMPSHIRE are very meagre ; perhaps, however, this may arise from the commonness of the species rather than its rarity. Mr. Thos. Ruddy, of Corwen, has received a pair from the neighbourhood of Winchester, and the writer of an anonymous letter in 'The Field' (March 29th, 1884) mentions having found a disused nest near Blandford, in Dorsetshire. As regards the ISLE OF WIGHT, the following editorial note occurs in 'The Field' of May 3rd, 1884 :—"We have the authority of Mr. A. G. More for stating that it (the Dormouse) is common in the Isle of Wight." Captain Hadfield informs me that at the present time it is fairly common throughout the Undercliff, and at Shanklin ; but that owing to building and increase of traffic, it is not so abundant as of yore. He also particularises Lincombe, a place where there is a hazel copse, about two miles from Ventnor, as a favoured locality.

In SUSSEX, KENT, and SURREY the Dormouse appears to be a common and well-known species, numbers being often caught in some districts for sale as pets. The boys at the school attached to the Royal Medical Benevolent College at Epsom used to catch and keep them ; I have known them to occur also at Holmwood, near Dorking, and have frequently seen them advertised for sale from Leapale, near Guildford. Mr. W. Ashby, writing in 'The Field' from Faversham, Kent, says—"The woodmen turn them out of old stumps when cutting wood in the winter."

From GLOUCESTERSHIRE there are no reports, but from its

occurrence in nearly every adjoining county there can be little doubt that the Dormouse is to be found there.

In BERKSHIRE the Rev. H. A. Macpherson informs me that about Reading, according to Mr. Aplin, it is quite common; and in North OXFORDSHIRE he (Mr. Aplin) has had more than one report from good observers of its occurrence. Mr. John Worley, writing in 'The Field,' says "the Dormouse is to be found in the forest of Wychwood, Oxfordshire," and another correspondent, J. B. R., in 'The Field' of April 19th, 1884, writes:—"Dormice are not at all uncommon about Henley-on-Thames. A boy who used to live at Nettlebed (a village five or six miles distant) and come to school every day, has brought in scores. This is no exaggeration."

Mr. J. Fletcher Woods, of Newmarket, writes:—"In 1856 I found several in the parish of Woburn, BEDS, and in that and the following year I took several in the parishes of Great Brickhill and Bow Brickhill, both in BUCKS, whilst only as late as last year (1883) I found one in its nest in the Devil's Ditch, in CAMBRIDGESHIRE, within a mile and three-quarters of Newmarket. They were by no means rare in those parts of Beds and Bucks from whence I got my specimens, during the time named." Mr. F. H. Parrott, of Aylesbury, states (April 19th, 1884) that "Dormice occur in the beech woods on the Chiltern Hills in Buckinghamshire, and are locally known by the name of 'Sleepers.'"

No reports are forthcoming from MIDDLESEX, though this animal has been observed in every adjacent county. It may be as well to state here that this being merely a summary of the evidence published in 'The Field,' supplemented by some additional information supplied by various naturalists, I have consulted no county lists, having in fact no convenience or leisure for doing so; though doubtless, by that means, aided by an examination of local collections, a better idea of the distribution of this interesting little rodent might be attained.

In HERTFORDSHIRE the Rev. H. A. Macpherson informs me that it was very plentiful a few years ago, and in all probability it is so still.

As regards ESSEX, Dr. H. Laver, of Colchester, writes me that the Dormouse is found distributed over nearly the whole of the county, and in some parts very abundantly; but he is not sure that it extends to the Stour, which river apparently forms a

barrier to the range of this animal towards the coast northwards as far as the Wash.

With the exception of a district in the south-western part of the county, and near Ipswich, I can up to the present hear of no single well-authenticated case where the Dormouse has been observed in a wild state in SUFFOLK. An anonymous correspondent of 'The Field' speaks of it as "not uncommon in parts of Suffolk," but unfortunately omits to say in *what* parts. He mentions having lately received one from West Suffolk; and its occurrence at the Devil's Ditch, within less than two miles of Newmarket, as recorded by Mr. Woods, renders the existence of this animal near the confines of Cambridgeshire a thing to be looked for where the country is adapted to its habits. Through the kindness of Dr. Laver I am enabled to indicate one district in the south-west of the county where the Dormouse is found, on the authority of Dr. Bree; who, in a letter to Dr. Laver, dated from Long Melford, says—"The Dormouse is well known about here," and goes on to state that two "sleepers" were quite recently caught by a man while at work in a large wood near Lavenham. Both these places are within a short distance of the Stour. A gamekeeper on the Tendring Hall estate near Nayland, on the Suffolk side of the Stour, in reply to an enquiry from Dr. Laver, stated that he had found very few nests on that estate. Mr. H. Miller, jun., of Ipswich, has on more than one occasion, during entomological excursions, seen the Dormouse "at sugar" at Dodnash and Old Hall woods, in the parish of Bentley, near Ipswich, and once possessed a specimen which was found in its nest near the Gold Road, in the parish of Stoke, Ipswich. He believes it to have been not uncommon in that neighbourhood as recently as twenty years back.

As regards the county of NORFOLK, Mr. Southwell, of Norwich, in a communication to 'The Field' states that though recorded in Paget's list as occurring in that county, twenty years' observation and enquiry among the numerous naturalists distributed throughout Norfolk have not enabled him to confirm that statement. Of late years, however, a colony of dormice has made its appearance in a district situated in the south-east. For this intelligence, together with the following interesting account of its probable origin, I am indebted to Mr. W. M. Crowfoot, of Beccles, who, in a letter dated April 11th, 1884, says—"I find on

inquiry that the Dormouse has been taken during the last few years in the parishes of Gillingham, Geldeston, and Stockton. J. Spencer, the gardener at Geldeston Hall, tells me that he frequently finds them. His master, the late Mr. T. Kerrick, turned off six or seven dormice procured from Surrey about forty years since; but it is now so common that Spencer doubts whether the present mice can all have sprung from those six or seven; and if so the species has now spread to Stockton Wood, a mile and quarter to the north-west of Geldeston Hall; and to Dunburgh, nearly a mile to the south of Geldeston, in both of which places it has been taken."

With the exception of Mr. Wood's account of the finding of a Dormouse in its nest in the Devil's Ditch, there are no reports from CAMBRIDGESHIRE, and the same may be said of HUNTINGDONSHIRE.

The evidence received from NORTHAMPTONSHIRE is also scanty and unsatisfactory, and consists of an anonymous letter to 'The Field,' in which the writer states that he has occasionally seen dormice in the spinneys and hedgerows at the south-western extremity of the county.

Coming next to WARWICKSHIRE, I am informed by the Rev. H. A. Macpherson that Mr. O. V. Aplin has a stuffed specimen caught at Edgehill, while two notes from anonymous contributors to 'The Field' testify to its occurrence in that county, in one of which the writer speaks of having seen and watched one in April, 1883, near Yardley Wood.

As regards WORCESTERSHIRE, in 'The Field' of May 3rd, 1884, the following editorial note appears:—"In Hasting's 'Illustrations of the Natural History of Worcester' the author states (p. 61) that the Dormouse is abundant in most of the woods in that county." Mr. H. Shaw, of Shrewsbury, has also informed me of its occurrence there, as well as in HEREFORDSHIRE; and an anonymous letter in 'The Field' confirms the statement as regards the latter county.

In SHROPSHIRE Mr. Shaw tells me it is far from rare, and he frequently has specimens brought him. He states that it is found too in the adjoining county of STAFFORDSHIRE, as also appears from the following note by Mr. J. R. B. Masefield (Abbots Haye, Cheadle), which lately appeared in 'The Field':—"I recently had occasion to make enquiries as to its occurrence

in North Staffordshire, where it is no doubt commonly to be found in most of our woods. In January last an intelligent woodman informed me that he had frequently seen and caught dormice in the woods around here, and to prove his words he brought me a living specimen a few days afterwards; another living specimen I saw last year, also caught in this immediate neighbourhood. I have also received reliable evidence as to the frequent occurrence of the Dormouse in other parts of the county."

Mr. W. Ashby, in a note published in 'The Field,' mentions having found dormice on the borders of LEICESTERSHIRE and WARWICKSHIRE, which is the only evidence I am able to adduce of their existence in the former county.

From DERBYSHIRE there are no reports whatsoever.

As to NOTTINGHAMSHIRE, Mr. J. Whitaker, of Rainworth Lodge, near Mansfield, writes me that notwithstanding numerous inquiries he can only hear of its existence in one locality (a wood near Worksop), where there are two colonies.

From RUTLANDSHIRE no information has been received.

Mr. Cordeaux informs me that he has never met with the Dormouse in any part of LINCOLNSHIRE, nor has he any note of its occurrence within the bounds of that county, but thinks it quite possible there may be localities where it is to be found, which appears to be the case in the south-west, as shown by the following extract from a note by Mr. H. Rudkin, of Old Trafford ('Field,' May 24th, 1884):—"I believe it is to be met with in most of the woods of South Lincolnshire, or at least those between Grantham and Bourn. About the year 1868 I saw one in a labourer's cottage, which the man had found in a torpid state among the sale lots in Ripsley Rise Wood. Some years after I saw in the possession of the same man another, which he had obtained while working in the woods, but I forget the exact locality, although it must have been within a few miles of the spot where he found the other."

Mr. Shaw, of Shrewsbury, writes me that the Dormouse is found in CHESHIRE.

The only evidence received relating to its occurrence in LANCASHIRE is comprised in a note by Mr. J. P. Thomasson in 'The Field,' who says—"Some fifteen or twenty years ago I found some nests of the Dormouse on the banks of the River

Hodder, dividing Lancashire from Yorkshire, and saw the owner." One of these nests is stated to have been built in a scraggy furze-bush.

The range of the Dormouse in YORKSHIRE, taken in hand by Mr. W. Denison Roebuck, has been more carefully and completely worked out than is probably the case with any other county. The result of his researches, as published in 'The Field,' is as follows:—" Taking the records geographically, we will begin with Cleveland, a district which it has been known to inhabit since 1808, in which year it was enumerated in the catalogue of Cleveland animals, which was printed as an appendix to Graves' 'History of Cleveland.' Coming now to the manuscript information, I find that Mr. George Page considered it rather scarce near Guisborough, Mr. T. H. Nelson that it was not numerous near Redcar, and Mr. Robert Lofthouse, of Middlesborough, stated that in the spring of 1881 he met with it near Pinchinthorpe. Mr. James Carter, when staying at Saltburn-by-the-Sea some years ago, saw a specimen which had been taken near Lofthouse-in-Cleveland. Mr. George Abbey only saw a single specimen during the time that he resided at Grinkle Park, near Lofthouse, of which place he was a native; it ran out of its nest, which was situated in a thorn-bush about a yard from the ground. There are specimens in the Whitby Museum which have been taken in the district, but Mr. Thomas Stephenson does not consider it a common species there. A few are found at Glaisdale in Upper Eskdale, according to Mr. William Lister, of that place—a statement which is corroborated by Mr. John Braim, of Pickering. Mr. R. Clarke, of the last-named place, has been shown several specimens taken in woods above Pickering, though he had found none himself. Passing now to the beautifully wooded upper vale of the Yorkshire Derwent, I find that Mr. William Scoby reported it as frequently met with about Helmsley, Kirby Moorside, and Pickering, while Mr. James Brigham, of Slingsby, stated that, although it is sometimes found with its nest in the woods about that place, the captures are rather unusual, and he did not think there were many in the district. Mr. Walter Stamper regarded it as not common about Nunnington, and Mr. Peter Inehbald has found it at Hovingham. On April 21st, 1871, the latter gentleman recorded one found asleep in its 'drey'; this was formed of dry grasses, chiefly

Holcus lanatus, and a little wool. For the East Riding of Yorkshire the only record is one by Mr. W. B. Brigham, of Driffild, that there are many about Neswick, near that place. He added that they store up for winter an immense amount of nuts, and remarked upon their beautiful eyes. In South Yorkshire Mr. C. J. E. Broughton reported it as occasionally found in the extensive woods at Wharmliffe, some parts of which are, I may add, in their pristine condition. Mr. George Roberts is my authority for stating that the species occurs at Bretton, near Wakefield, while Mr. J. H. Salter had not seen it about Ackworth, but had been told that it is found about Huddersfield. Probably this impression sprang from a perusal of Mr. Hobkirk's 'History and Natural History of Huddersfield,' where we read that it is rare at Storthes Hall Woods, and at Kirkheaton. Further north I can personally vouch for its occurring in small numbers in the coppices and woods of the Meanwood Valley, near Leeds, a considerable portion of which is within the limits of the parliamentary borough. I have seen various specimens from these woods during the past ten years. They have been found in West Woods, near Wetherby, Mr. John Emmet told me, but he had not heard of their appearance in late years. At Ryther, near Cawood, Mr. Walter Raine considered it not a scarce animal, a few being killed by the farmer's sons annually during the nutting season; but at Aldborough, near Boroughbridge, Mr. H. Andrews considered it rare. In the North-western Fell (or hill) district it is found in several localities. In the woods about Hornby Castle, near Catterick, Mr. John Grassham's father used to meet with it not uncommonly; and at Middleham, in Wensleydale, Dr. J. E. Miller regarded it as pretty plentiful in the woods. It occurs near Fountains Abbey, as I was informed by the Rev. H. H. Slater, on the authority of Mr. Lickley, the Ripon bird-stuffer. This is confirmed by Mr. James Ingleby, of Eavestone. In Wharfedale a few are found in Bolton Woods, as I was informed by the late Mr. J. Petyt, the Duke of Devonshire's agent there. In Airedale, Mr. George Bishop regarded it as very scarce about Skipton; and Mr. John T. Calvert expressed a similar opinion as to Keighley, in which neighbourhood he has known a few to have been taken in Houdin Wood. For the western slope of the Pennine range of hills there are two records to give, additional to that of Mr. Thomasson's in last week's

'Field.' About Austwick, a village at the base of Ingleborough Hill, Mr. T. R. Clapman considered it a very occasional species; but Mr. F. S. Mitchell, of Clitheroe, says that it is occasionally found in all parts of that corner of Yorkshire which lies between Clitheroe, Slaidburn, and Bolton-by-Bowland, and in certain localities therein it may even be called common. This mass of detailed and concurrent evidence goes far to show that the species ranges over the wooded portions of our large county, of which it is most undoubtedly a native; and there can be no reason to doubt the correctness of the identification made by the gentlemen whose names I cite as authorities for the records, as several of them are naturalists of not inconsiderable attainments, and all of them are careful and painstaking field observers."

Mr. W. Storey, Pateley Bridge, Leeds, in a note published in 'The Field' of May 3rd, 1884, says:—"Mr. Joseph Kirkley, of Brinham Rocks, Pateley Bridge, informs me that during the summer of 1877 he found a nest containing several young Dormice in Brinham Woods. Last spring I observed one in its wild state in Guyscliffe Woods, Pateley Bridge. Mr. George Charlton, of this place, has in his possession at the present time a live Dormouse, which was taken hybernating in Wath Woods, Pateley Bridge, about a fortnight ago. Woodmen in this neighbourhood meet with a few annually."

As regards DURHAM, Mr. Roebuck, in the article lately quoted, says—"It has long been on record for the county of Durham. So far back as 1863, Messrs. Mennell and Perkins published a list of the Mammalia of Northumberland and Durham, in which they cited the Dormouse as of rare occurrence, taken occasionally in the woods which clothe the valley of the Derwent at Gibside, Winlaton Mill, and near Ebchester." Besides the above, Mr. N. M'Lachlan, of Lambrook, Bracknell, Berks, in a recent issue of 'The Field,' writes as follows:—" Some fourteen or fifteen years ago I observed the Dormouse in the county of Durham, at Headlam, a small village about half-way between Darlington and Barnard Castle. For several days a pair of these little creatures had frequented a large peach-tree growing on a warm south wall in the Hall gardens, and eventually one of them was drowned in a bottle of beer and sugar which had been hung on the tree to catch the wasps, as the fruit was just ripening.

IN WESTMORELAND the Dormouse appears to be of rare occurrence. A correspondent of 'The Field' (April 12th, 1884), writes as follows:—"The late Dr. Gough, in his list of Mammalia found within six or seven miles of Kendal, Westmoreland, published in 1861, describes the Dormouse as "not infrequent." Whatever it may have been then, its occurrence there now is very infrequent. Another anonymous correspondent, writing under date April 19th, 1883, mentions having found one in its nest, some years ago, on the lower slopes of one of the fells at the southern end of Lake Windermere; but it may be observed that the value of such communications as the above would be greatly enhanced if accompanied by the name of the writer.

Again, as regards CUMBERLAND, the only information I am able to bring forward is taken from another unauthenticated note, to which the initials only of the writer (T. N. P.—[Hallthwaites]) are appended. He says:—"I have frequently met with this animal in the district of Millom, South Cumberland. One was shown me, some winters ago, frozen to a piece of wood; and last year, while trout-fishing, a boy with me found one amongst the rocks on the banks of the stream."

As to NORTHUMBERLAND, with the exception of Messrs. Men-nell and Perkins' list above referred to, I can find no evidence of the occurrence of the Dormouse in that county. The places mentioned in the above list (see DURHAM), quoted by Mr. Roebuck, are on the Durham side of the Derwent, and I am not aware that any locality in Northumberland is given.

That this little animal is found in Wales is proved by reports from several districts. In GLAMORGANSHIRE I am told that it is occasionally found by wood-cutters, but am not at liberty to give the name of my informant, the accuracy of whose statement, however, I have no reason to doubt.

Mr. H. Shaw, of Shrewsbury, tells me it occurs both in RADNORSHIRE and MONTGOMERYSHIRE. A note appeared in 'The Field' (April 5th, 1884), signed "Laisters Lort," in which the writer states that he found a Dormouse rolled up in its nest, in the parish of Llanllugan, in the latter county, during the winter of 1881-2; and an anonymous writer, 'Field' (May 3rd, 1884), also bears witness to the existence of this animal in Montgomeryshire some five or six years back.

AS to MERIONETHSHIRE, Mr. Thos. Ruddy, of Palé Gardens, Corwen, in a note published in 'The Field,' says—"It was found on the estate of Mr. Robertson, M.P., at Tyfos, near Corwen, in a dormant state, in early spring, by men employed in planting forest-trees. Several were brought to me by one of the men, to know what they were. He said they were found rolled up in leafy balls, the leaves being gummed together, as it were." He adds, "None of my near neighbours ever saw the Dormouse in Merioneth before, and I have not heard of its occurrence in any other part of the county."

The following note by Mr. J. B. Catterall, of Denbigh ('Field,' April 19th, 1884), refers to DENBIGHSHIRE:—"The Dormouse breeds freely at Parc-Mostyn, a few miles south-west of Denbigh, in a hilly and wild country." In the same paper, under date May 24th, 1884, another correspondent states that he picked up a dead Dormouse at Mostyn, FLINTSHIRE, on May 19th, just outside Lord Mostyn's park. Two anonymous contributions to 'The Field' also bear witness to the existence of dormice in a wild state in the two last-mentioned counties; and in one of these the writer mentions the Leeswood Woods, near Mold, Flintshire, as a locality where they used to be plentiful.

This scanty and imperfect sketch can only be taken as giving some slight indication (a mere outline, as it were) of the distribution of this interesting little rodent in England and Wales: the lack of notes from many parts of England, such as Derbyshire, Rutlandshire, Northamptonshire, &c., may perhaps indicate a lack of observers rather than an entire absence of the species in question; and the same may be said of Wales, though doubtless many districts of that mountainous corner of our island would scarcely be adapted to its habits. From among the mass of material from which the foregoing has been compiled, but few facts have transpired relating to the Natural History of the Dormouse, apart from the bare announcement of its existence: such as have appeared are, however, of considerable interest.

Bellamy, in his 'Nat. Hist. of South Devon,' says—"In the unique collection of G. Leach, Esq., comprising a nearly perfect cabinet of British Mammals, there is a white variety of the Dormouse, taken in Devon." Not long since an example having a white tip to its tail was advertised for sale in the 'Exchange and Mart' by a person living at Berkhamstead, Herts. With

respect to the age to which this little animal attains in a state of confinement, a correspondent of 'The Field' (East Sussex), who states that he is accustomed to feed dormice exclusively on apples and nuts, goes on to say—"Four years is the longest time I have known them live in confinement; and in a letter received from Capt. Hadfield, that gentleman mentions a second instance of a pet Dormouse attaining this age. I believe this exceeds the average duration of life of the white and coloured varieties of *Mus musculus* so often kept as pets. The provincial name of "Sleeper" seems to be very generally adopted, but I am informed by Mr. D'Urban that in South-eastern Devon the Dormouse is universally known as the "Seven Sleeper," whereas in Cornwall, according to Mr. J. Brooking Rowe, the word "Dormouse" frequently becomes "Dorymouse." In conclusion, I must express my thanks to those naturalists (too numerous to mention by name) who have supplied so much of the material for this paper.

Since writing the report for the county of Suffolk, as given above, I have received a letter from the Rev. Churchill Babington, of Cockfield, near Bury St. Edmunds, who says—" . . . My man, Alfred Parish, has repeatedly found the Dormouse in this part of Suffolk when a boy, and also subsequently." The following statement by Parish, kindly taken down and forwarded by Mr. Babington, shows that this species recently existed, and in all probability is still to be found, in the neighbourhood of Bury St. Edmunds, the district in which it has been found comprising at least six parishes in close proximity to each other:—"Dormice have been found in Bull's Wood, Cockfield, about two years ago, in September; many nests found also with their young. In Rougham, one within ten years; in Thurston, Beyton, Bradfield St. George, and Rushbrook, nests found about thirty or thirty-five years ago. Not at all uncommon in the neighbourhood, and probably as common now."

NOTES ON THE VERTEBRATE ANIMALS OF LEICESTERSHIRE.

BY MONTAGU BROWNE, F. Z. S.

Curator, Town Museum, Leicester.

(Continued from p. 169).

Order INSECTIVORA.

Talpa europæa, Linn. Common Mole.—Generally distributed and common, breeding in the county. Harley was informed by a man who had been a professional mole-catcher for more than sixty years, that he had never seen a mole alive in a state of freedom. Mr. Macaulay tells me that some few years ago (1881 or '82) he observed one whilst driving between Mowsley and Saddington, and succeeded in catching it before it had time to bury itself. Harley says:—"Buff and white, or parti-coloured individuals occasionally occur." One in Leicester Town Museum, labelled, "From Belvoir. Mr. Jno. Ryder." This specimen I find noted in old MS. Donation Book as being presented on April 25th, 1862. It is of a uniform cream-colour, inclining to ferruginous on the limbs. The Rev. Andrew Matthews, M.A., Rector of Gumley, showed me one precisely similar, caught by a mole-catcher in an adjoining parish during the first week of June, 1884, the man stating at the time that he had met with several other examples during the course of his trapping. This specimen was recorded in 'The Zoologist' for July, 1884, page 271. Curiously enough, Mr. Matthews procured another on March 20th, 1885, which had been caught in a trap at Laughton Hills. He describes it as being the handsomest he ever saw, a large male of an amber colour, with the nose white nearly to the eyes, cheeks and back of the head and neck bright orange.

Sorex vulgaris (Linn). Common Shrew.—Generally distributed and common, breeding in the county. Harley remarks upon the great numbers found dead in pathways every autumn.

Sorex fodiens (Pall.) Water Shrew.—Harley says:—"Not common. Occasionally met with on the banks of water-courses and drains in the meadow lands near Loughbro'." Mr. Widdowson writes, February, 1885:—"I know one locality they frequented a few years ago, namely, Sysonby, about a mile from Melton."

Erinaceus europæus, Linn. Common Hedgehog.—Generally

distributed and common. I have received several from Knighton—close to the town of Leicester—where it breeds. On 13th September, 1883, an old female hedgehog and four young ones were brought to me from thence. Another one, caught also at Knighton, we endeavoured to keep. It remained for some time in the work-room at the Leicester Museum, hiding itself during the day under the box of a step leading from one room into another. Our porter, who was very kind to it, tells me that he saw it several times away from its retreat, but that it was not at all tame, although he constantly fed it with bread and milk. One day it came out while several of us were there, and the next day it ran around our feet squeaking and trying to nibble at our boots. It would not, however, eat bread and milk, so we procured meat, liver, apples, potatoes, carrots, anything we could think of, but it refused everything, though apparently very hungry. The next morning it was dead.

Order CHIROPTERA.

Plecotus auritus (Linn.). Long-eared Bat.—Generally distributed and breeding. Harley writes:—"Widely diffused over the county. Partly gregarious. Plentifully found in Bradgate Park, where, no doubt, it finds shelter by day in the pollard oaks, ruins, crannies of rocks, and holes which abound there. Breeds in the county." Mr. W. A. Vice, M.B., brought me a specimen procured by him at Blaby Mill about 1883.

Synotus barbastellus, Blas. The Barbastelle.—Not common. The Rev. A. Matthews showed me one specimen of this curious little bat, procured at Gumley about 1876.

Vesperugo pipistrellus, Blas. Pipistrelle; Common Bat; "Flitter-mouse."—Commonly diffused and breeding. I have procured several specimens at Aylestone, the last, a male and female, on 23rd April, 1885. Harley notices that this species is often observed on the wing during the day, and remarks that in this it differs from the Great Bat.

Vesperugo noctula, Blas. Noctule, or Great Bat, or "Rat Bat."—Generally distributed and breeding. Harley remarks that this species appears to be most common in the vicinity of the Town of Leicester, and is most often observed on still summer evenings. I have observed it once or twice each summer since 1880, but last year (1884) so many were flying near the Aylestone

Mill on an evening at the end of June that I brought out my little .410 walking-stick gun, and in a few minutes killed several, one of which (a male) measured nearly fourteen inches in extent of wings. During the fine weather between the 17th and 23rd of April, 1885, several were observed in the evening, and on the 21st I shot a young male at Aylestone. The Rev. A. Matthews tells me (March, 1885) that one broiling-hot day in July, some years ago, at mid-day, when the air was perfectly bright and clear, he observed swallows circling at an immense altitude, and above them, at a much higher elevation, four large bats, which he supposed to be of this species.* No doubt this is the species (the Noctule) about which Widdowson writes me (12th February, 1885), under the heading of "Red Horse-shoe Bat."† He says:—"We were cleaning up the church, and at the end of a beam there was a hole where it went into the wall. I could smell the bats within (very warm and acrid); I put my arm in, then called the men for a cement tub which stood near, and brought them out by handfuls, I should think thirty or more, and not one of them bit me. Being very busy, and not being much up in bats, only knowing three or four at that time, I let them go; but on describing them to a gentleman some time after, he said they were rare. They were a ruddy brown colour, nearly as big again as a short-tailed grass Mole; he called them the 'Red Shoe Bat.' I did not notice the nose."

Vespertilio nattereri, Kuhl. Reddish-grey Bat; Natterer's Bat.—Rare. I am enabled to add this species, which is rather rare in Britain, on the authority of the Rev. A. Matthews, who showed me a specimen caught in his house at Gumley some few years ago—he cannot recall the exact date. It will be observed that of the fourteen species of Bats which, according to Bell (second edition), are found in Britain, but five have as yet been noted in Leicestershire; here then is a field for investigation open to county naturalists, and I would therefore ask them to kindly forward all unknown bats to me for identification, and the specimens so forwarded shall be returned if desired.

* Our correspondent has overlooked the fact that Gilbert White named this bat *Vespertilio altivolans*, from this very habit of feeding high in the air. See Letter 36 to Pennant.—ED.

† *Rhinolophus ferrum-equinum* has—so far as I am aware—not yet occurred in the county.

Order RODENTIA.

Lepus europæus, Pall. Common Hare.—Generally distributed and common; breeding. Some winters ago, I forget the exact date, the local papers recorded the fact of a hare running through the principal streets of the Town of Leicester, and being ultimately caught in Lancaster Street.

Lepus cuniculus, Linn. Common Rabbit.—Generally distributed and common. Breeding. Harley mentions that in Bradgate Park, where it abounds, "black and parti-coloured varieties are met with." I received a white one in the autumn of 1881 from thence, and in the spring of 1884 I saw a black one run out from a little spinney at Knighton, on land farmed by Mr. Lander. On April 17th, 1885, I was with Mr. John Hunt at Thurnby, on land in his possession, and, amongst a great number of rabbits which were feeding out, we saw several white and parti-coloured ones, no less than five being seen at one time. Of course, at our approach they bolted into their burrows amongst thick scrub; but, by keeping perfectly still, we were enabled to get a near view of those which, deceived by our quietude, shortly re-emerged. So near were they, that we were able to see that two or three had sandy patches on their ears and other parts of their bodies, whilst others were pure white. A fact which struck us as singular was that these white rabbits should retain their snowy appearance after scampering through wet grass, muddy places, and up and down their burrows. Being in close proximity to dwelling houses, it is, of course, possible, nay probable, that these varieties may have been produced by crossing with tame ones.

Mus rattus, Linn. Black Rat.—Probably extinct in this county. Rev. A. Matthews writes me, 26th January, 1885, that he has never heard of its occurrence in the county. Messrs. Widdowson and Ingram, writing in February, 1885, say the same.

Mus decumanus, Pall. Brown Rat. — Its distribution in the county is unfortunately too general.

Mus musculus, Linn. House Mouse.—Far too common. Several specimens of a curious variety were caught at Kibworth in middle of March, 1885, in taking down a corn stack belonging to Mr. Buzzard. One of them, handed to me by Mr. Macaulay, was of a dingy white, with the exception of the back, which

retained faint traces of original mouse-colour, caused by the tips of the hairs being of a dusky whity-brown. As the specimen was placed in spirits I was unable to judge if the eyes were pink or black, but they appeared to be of the latter colour—and indeed this has since been stated to be the case. Whether a cross between escaped albino mice and the common mouse, or merely an accidental variety, it is hard to say, but as the owners of the house do not appear to have ever kept “white mice” the presumption is in favour of the latter supposition. In evidence of the fecundity of this species I may state that Mr. A. W. Evans, of Soar Lane Mill, brought me a litter of no less than twenty-two naked young ones on 31st March, 1884.

Mus minutus, Pall. Harvest Mouse.—Rare. Harley states that it is not certain that this species is found throughout the county, having been met with by him in only one or two parishes in the southern division, as for instance at Cosby and Whetstone. It has also occurred in the eastern portion of the county, namely, in the parish of Wolstrup, on the estate of the Duke of Rutland. Mr. Ingram, writing from Belvoir, does not mention it, but Mr. Widdowson says, February 6th, 1885:—“A few—not many—have come into my hands.” Writing again on the 12th, he says:—“The last Harvest Mouse I had was from Burton Lazars. Distributed thinly, I think, near here.”

Mus sylvaticus (Linn.). Long-tailed Field Mouse.—Generally distributed and breeding. Harley says:—“Common. Distributed over the county.” He examined the winter retreat of one of these mice near Bradgate Park, and was astonished at the quantity of stores which had been carried in, and which he computed at the fourth part of an imperial bushel.

Arvicola amphibius (Linn.). Water Vole.—Generally distributed and breeding. Harley remarks that “this species is much preyed upon by the Weasel and Stoat. The Heron, moreover, attacks it, and preys on it occasionally. Liable to variety.” Regarding the last statement I was always of opinion that this species, with the exception of the black variety mentioned by Bell, was most constant in its coloration, having had the opportunity of examining some hundreds—from all parts of England—since boyhood, but Mr. R. Widdowson, the well-known taxidermist of Melton Mowbray, assures me that he can, any season, procure near Melton a constant light-red variety,

and in proof of his assertion he sent me, a year or so ago, a mounted specimen which, though apparently sun-faded on the one side, appears to be of a very light red, almost yellowish-rufous on the other. I was witness to a curious trait in the character of this animal on April 11th, 1885. Walking in the meadows at Aylestone with my dogs, I observed some rat-catchers at work on an old hollow willow tree, from whence they dislodged, with the help of their ferrets and dogs, several common rats and three Water-Voles, two of which evaded them by swimming. The third one was, however, caged with three of the common Brown Rat. The latter appeared abjectly terrified at our approach, and at that of the dogs, and huddled together with their heads tucked under their bodies. It was otherwise, however, with the Water-Vole, which upon our approach reared himself upon his haunches, bared his teeth and snapped them, squeaked, and shook his paws at us with the most threatening gestures, and would have flown at us outright had it not been for the protection of the bars. His conduct regarding the other rats was fair in the extreme, for he bit them in the most severe and impartial manner whenever they approached his corner. Indeed, one rat nearly "left his tail behind him" under the quick strokes of the plucky Water-Vole's formidable incisors.

Arvicola agrestis (Linn). Common Field Vole; Short-tailed Field Mouse.—Generally distributed, common, and breeding.

Arvicola glareolus (Schreber.). Red Field-Vole.—I have not yet met with this species in Leicestershire, but it doubtless occurs, as Mr. Ingram, writing on 7th February, 1885, and enumerating the mice and voles, says, "and another, also short-tailed, but of a light fox-coloured skin."

Muscardinus avellanarius (Linn.). Common Dormouse.—Rare. Harley says:—"Not common. Met with in a small wood which lies over against Ravenstone, and between that village and Normanton on Heath," but in no other woods of the county did he discover it. Widdowson writes, February 6th, 1885.—"Not heard of for a certainty, save one brought in a load of oak bark." Mr. Ingram writes, 7th February, 1885:—"I have never met with it."

Sciurus vulgaris, Linn. Common Squirrel.—Generally distributed and breeding. Harley writes:—"It more especially abounds in our enclosed parks and woods. Garendon,

Donnington, and Gopsall abound with it. . . . Subject to much variety." On this point I think Harley in error. The only varieties I have met with are the ordinary ones due to sex, age, and season; the young being bright red in summer, and at all ages changing at the approach of winter to greyish red, due, I think, to what in birds is called "point-casting" of the hairs. A curious, though not very uncommon example, exhibiting malformation of the teeth in this animal, was presented to the Leicester Town Museum by Mr. R. Wingate, on April 18th, 1876. In this specimen the upper incisors have become prolonged and curved into a half-circle in this manner:—The right upper incisor is considerably lengthened, coming below the lower jaw; it then ascends and curls around, reaching to just below and in front of the eye, forming a perfect half-circle, measuring $1\frac{5}{8}$ in. on its inferior curve. The left upper incisor follows the curve of the other until it reaches the lower jaw, when it bends slightly away, and enters the mouth, curving upward, inside, until it touches the palate. Both the lower incisors are pushed away to the left side; the right lower incisor not only bending outward, but growing to the length of $\frac{3}{4}$ in. No locality is given with the specimen, and I therefore assume it to have been a caged animal, fed, doubtless, upon food too soft to allow the natural grinding down of the teeth necessary to prevent such malformation.

(To be continued.)

ON THE SEASONAL CHANGES OF PLUMAGE IN BIRDS.

BY ALFRED CRAWHALL CHAPMAN.

No doubt naturalists have frequently observed the great dissimilarity in the seasonal plumages of many species of birds. This is strikingly noticeable in the case of the Golden Plover. On the Northumberland moors the Golden Plover may be said to breed commonly. Small parties of them may be seen frequenting the lower grounds all through the winter. About the beginning of February the change from the white breast of winter to the black of summer commences, and gradually increases until the bird has attained its full summer dress. When on the wing these dark-breasted birds appear to be much blacker than they really are. Having shot what appears to be a very black-breasted bird,

one finds that many of the white feathers of winter are still visible, giving the bird a checkered appearance.

What appears most strange is that these birds never reach what is considered the typically adult summer plumage of the Golden Plover. It matters not at what period of the breeding season, this undeveloped plumage is always conspicuous. Now, I would ask, what is the natural cause of this?

Even in Shetland the summer dress of the Golden Plover is much darker, *i.e.*, more developed than in Northumberland; but if we visit Lapland or Siberia, we find there the Golden Plover in what we consider their typically adult summer dress. If they had to endure greater cold or stress of weather at their northern breeding-stations, one could perhaps account for the more adult form of plumage by a greater thickness of feathers; but such is not the case. Indeed, I venture to say that the Northumberland birds have, if anything, the greater cold to endure. Perhaps it is that the birds which frequent our moors in winter are not the birds which remain to breed with us; possibly all these birds migrate northwards to Lapland and Siberia, their places being taken by another and different set of birds, which have spent their winter in more southerly latitudes, and which make our counties the northern limit for their spring migration. This is a theory difficult to solve. It may be that the reverse is the case, and that the birds which winter also remain to breed with us, and that there is a great migration from the Mediterranean direct to the morasses and tundras of Siberia.

I think, perhaps, this is most likely to be the case, as many specimens of birds which seldom breed south of the Arctic circle are regularly obtained in their adult summer plumage in the very south of Europe, about the middle of May.

My brother, Mr. Abel Chapman, shot Curlew Sandpipers (*Tringa subarquata*) in their rich rufous plumage, as well as Grey Plovers (*Charadrius helvetica*) in adult summer dress, on the Guadelete, near Jerez, in Southern Spain, on May 8th, and these birds would have about 3000 miles to travel northwards before they could find a suitable breeding-ground; although perhaps it is not necessary to mention here that the Curlew Sandpiper is, I believe, the only British bird whose nest has never yet been discovered. The rapidity with which birds execute their spring and autumn migrations must be something marvellous, for I have

shot Bartailed Godwits on the coast of Northumberland returning from breeding as early as August 11th, while by the 25th most of the northern breeding species, such as Greenshanks, Reeves, Sanderlings, Knots, Turnstones, &c., can be obtained.

On comparing skins of the Brambling (*Fringilla montifringilla*) shot in the Dovre Fjeld in Norway, with those obtained at a similar season in East Finmark, I notice the same relative difference in their stages of mature plumage as I have remarked in the case of the Golden Plover. The Finmark birds have the head, neck, and upper part of the back, of a rich glossy black, like our common Rook, whilst the Dovre Fjeld birds have the ends of the feathers edged with buff, showing the undeveloped change from their winter plumage. This would seem to indicate that the further north a bird goes to breed, the more perfect must the condition of the bird become, each feather seeming to obtain greater vitality than in the more southerly species, and, as a consequence of this, the gradual change of colour is extended further down each feather, till the whole of the feather, with the exception of that portion which wears off, becomes black. Probably the change from spring to summer and from summer to autumn plumage is effected both by means of change of colour in the feather itself, and by moult, according to the physical condition of the bird at the time.

It seems probable that the theory which holds good with regard to the changes of plumage in the true Falcons applies also to the case of the common Buzzard (*Buteo vulgaris*), and perhaps the following notes on the plumage of the latter species may be of interest.

During the months of May and June, 1878, my brother and I obtained many beautiful specimens of both old and young Common Buzzards in the large woods near Hesse-Cassel, in Central Germany. They seemed to be very common there, probably because they were quite unmolested.

On May 11th we found a nest containing two down-clad young, which were pure white, and one egg hatching; both the old birds were a uniform dark-brown, the male being much the smaller of the two.

On May 26th we found two nests, each containing two eggs; in the one case nearly hatching, in the other quite fresh. We trapped the old birds, and found them in similar plumage to those already described.

On June 8th found a nest containing two half-grown young. Their breasts were a spotless cream-colour, their backs mottled not unlike an unfledged Lesser Black-backed Gull. We reared these two young ones; by the beginning of July they had moulted their nest plumage; the breasts and under parts still remained a spotless cream-colour, the upper parts coming mottled brown, but divided by broad pale yellow stripes running longitudinally down the back. The tails were already a fine russet colour, barred with brown. We kept these two birds till the autumn of the year after they were hatched, and at this time they still maintained the plumage of the first moult unchanged. Their irides, however, which had been a pale transparent blue, were now gradually turning yellow. This change in the colour of the irides seems to be, in some cases, contemporaneous with the change of colour in the plumage of the bird's head, and is especially conspicuous in the case of the Marsh Harrier (*Circus æruginosus*) and Red Kite (*Milvus ictinus*). In both of the latter the irides change with the colour of the head, being nearly black when the head is very dark-coloured (as in the young Marsh Harrier), hazel when the head is brown, and pale yellow, approaching to white, when the head becomes white, as in the old birds.

With regard to the plumage of the parent birds of the two young ones which we reared, nothing could exceed the beauty of the male. With the exception of a fawn-coloured bar across the breast, the dark primaries and secondaries, a few bold blotches of brown on the back, and a golden-coloured tail barred with brown, his whole plumage was nearly pure white. The female had a cream-coloured breast and under parts, a handsome brown and white checkered back, the head brown, and the tail as in the male.

Though I have seen a good many nests of both the Rough-legged and Common Buzzard, I never saw the former nesting in a tree, or the latter otherwise than in a tree, usually rather high up. All the nests of the rough-legged species which I have seen have been on fell-craggs, nor does the plumage of this species seem to exhibit nearly so great a variation as in *Buteo vulgaris*.

The irides in *B. lagopus* darken in colour with the age of the bird, the adults having a hazel iris, those of the immature birds being yellow. This is certainly a striking anomaly, and shows how difficult it is to establish, even from observation, any reliable code for Nature's rules.

NOTES ON THE ZOOLOGY OF MANITOBA.

BY THE LATE T. B. WOOD.

(Communicated by T. H. NELSON.)

[THE following notes are extracted from the letters of my late friend Mr. T. B. Wood, of Middleton, near Manchester, who went out to Manitoba in the spring of 1882, and who lived for some time at Brandon, in the North West, the then terminus of the C. P. Railway. Mr. Wood was an enthusiastic naturalist, and, unfortunately, fell a victim in the cause of his favourite pursuit. One day, towards the end of October, 1883, having shot a rare Duck (a Buffel-head, I believe) on a slough, he incautiously waded into the water up to his waist to retrieve the bird, thereby contracting a severe cold and inflammation, which resulted in his death in a very short time.

As may be seen from his notes, the neighbourhood of Brandon abounds in animal life, especially at the periods of the vernal and autumnal migrations.

Mr. Wood was busily engaged in forming a collection of skins of the birds and other animals which are found in the North West, and it was his intention to have prepared a list of Manitoban Birds for publication in 'The Zoologist,' when his career was prematurely cut short, in the manner I have mentioned, at the early age of twenty-six.

The period over which his observations extended was from the end of May, 1882, to October, 1883, the first letter after his arrival at Brandon being dated May 31st, 1882, in which, after detailing his first experiences of Canadian life, and describing the town of Brandon, he proceeds in manner following.—T. H. N.]

On the journey from Minneapolis to Winnipeg, and thence to Brandon, we saw great numbers of Ducks, Herons, Bitterns, Goatsuckers, Plovers, Buzzards, Hawks, Prairie Chickens, Geese, and other birds which I did not recognize; as also a great many Foxes and Squirrels. The land all around here is as flat as a pancake, with a few scrubby trees occasionally, and here and there swamps on which you will always see Ducks and a Bittern or two. The day after my arrival I saw a herd of Bisons.

June 15th.—Early this month, B. and I drove out to Jeoman city and thence south across the prairie; we camped out about ten miles from Brandon and resumed our journey next day,

until we were about eighteen miles in a southerly direction from Brandon. It is about the finest country you could imagine in the wildest flights of fancy; Ducks getting up under your feet at every yard; Hawks, Goatsuckers, Prairie Chickens, and small birds in all directions; and, what do you think? the Black Tern breeding in hundreds; over a space of six miles I saw them in countless numbers. The Ducks were principally Blue-winged Teal, Pintails, Shovellers, and a black-looking Duck which I could not identify. I shot a Teal and a splendid Shoveller drake for the pot. I can fancy I hear you exclaiming against the barbarism of eating such a bird; but I am getting daily accustomed to birds which are considered rare in England, and regard them now from a more utilitarian point of view. I also saw a splendid pair of [Wilson's] Phalarope swimming on a pool only a few yards away; one of them kept rising and flying round, and I could distinguish the beautiful red and black neck quite plainly. We camped for the second night on the prairie, and the mosquitoes were very troublesome to my companion, but fortunately, they did not attack me; and we returned to Brandon next day.

July 2nd.—About the end of June we paid another short visit to the swamp and brought home a few more Shovellers. I have a Goatsucker sitting on two eggs just in front of my tent; and there are any number of Prairie Chickens' nests all round, most of them now containing young ones. Brandon looks lovely at night with fireflies flashing about like diamonds all over the prairie. I killed a Badger, a Goatsucker, and a Pintail, near here yesterday.

July 19th.—Early this month I was staying with a friend twelve miles away, at Badger Hill, close to the Assiniboine River, and surrounded by immense forests of oak, pine, and tamarac. The first evening of my arrival my friend and I sallied forth in search of game. I spied something moving along in the grass, and immediately firing at it with my rifle, had the satisfaction of seeing the beast roll over. On a nearer approach, however, we were unpleasantly apprised of the nature of the animal, for the odour which greeted our nostrils proclaimed the everlasting Skunk. Needless to say, we beat a hasty retreat. Next day we were busy cutting down trees, fencing and digging; now and then rushing with the gun after some *rara avis* passing near. I shot half-a-dozen large Hawks and Owls, and skinned two; one, I think, the Hawk Owl (*Surnia funerea*),

and the other, one of the Harriers (*Circus Swainsoni*), almost the colour of a common Gull. I also got a beautiful little Hawk, about the size of a Merlin, with blue wings and back like a Kestrel, blue and red head and red feet, apparently *Tinnunculus Sparverius*; and a fine Grey Shrike, exactly like our English species. I could shoot any number of birds if I liked, but only secure specimens when I have time to skin them, except in the case of Hawks, which I slay on most occasions when opportunity offers. All I have got so far I have skinned, though I have to do that part of the collecting when the day's work is over. When at Badger Hill we got up at 5 a.m. every morning, made up the fire, and then strolled down to the river with the gun and looked at our fishing lines; then back to cook what we had caught for breakfast. We got some immense fish at times. After breakfast we had a drive over the prairie or a row down the river. One day we were driving out, when suddenly we were saluted by the well-known cry of the Curlew (bringing back recollections of the Tees Mouth and Mostyn to my mind). There they were in couples; one foolishly passed over us, and I fired at it from the carriage; down it came, and then another bit the dust. They were very like our English Curlew, but buff-coloured on the breast and under the wings, and the same tinge runs all over the body. I guess it was the Esquimaux Curlew.* We plucked and ate them; but I will get specimens to preserve. Prairie Chickens are getting strong on the wing, and in another fortnight I shall be after them. The other night I scared a Wolf outside my tent, but did not get a shot at it.

August 5th.—I have been staying at Badger Hill a good deal lately, and I have done a little shooting. One day early in the month two guns bagged twenty-two Ducks and two Grebes. The Ducks are difficult to retrieve, and we lose quite one-half of what we shoot in the reeds. I shot two Yellowshanks (*Totanus flavipes*), and could have killed many more, but don't waste cartridges on such small game. On the way out here I got a fine Buzzard; its crop was full of grasshoppers and mosquitoes.

* [As nothing is said as to size, length of bill, wing, or tarsus, it is impossible to identify the species with certainty; but if "very like our English Curlew," it was most probably *Numenius longirostris*; for *Numenius hudsonicus* would have reminded the shooter of our Whimbrel, while the Esquimaux Curlew is so much smaller than either of these that it would have at once attracted attention on that account.—ED.]

The sail down the Assiniboine is very grand; woods on both sides resound with the songs of myriads of birds, of different kinds. I only fired two shots down the river and secured two beautiful Kingfishers (*Ceryle alcyon*). They are a little larger than our Green Woodpecker, and about the same shape. I saw some Sandpipers very like our common Sandpiper [doubtless the Spotted Sandpiper, *T. macularius*]. Birds are beginning to flock, and in a few weeks the migration south will commence.

(To be continued.)

NOTES AND QUERIES.

The Zoology of Central Asia. — The latest news from Col. Prjevalsky is contained in a letter dated Lob Nor, February 10th, from which the following is an extract:—"A year and a half have quickly passed since our departure from St. Petersburg, in which time we have accomplished two-thirds of our expedition. We have traversed 5200 versts of Central Asia, and successfully explored hitherto unknown regions. From a geographical point of view the results have been excellent, and, although less satisfactory, the additions to Natural History are not inconsiderable. The poorest collection is that of birds—1000 specimens, of which only one is new; this is a kind of Finch, *Leucosticte Robowosky*, with red plumage. We have been more fortunate in quadrupeds, having obtained 33 specimens of *Ursus lagomyiarius* (?), of various sizes; and among the novelties are four animals of the cat tribe; two lynxes; a new deer, *Capreolus magnus*; a wild sheep; an antelope, *Antelope Cuvieri*; and several probably new types of *Lepus* and *Lagomys*. The number of fish and aquatic animals is also considerable. We have passed the autumn and winter in the western regions of Zaidan and Northern Thibet, where we made many geographical discoveries. We arrived at Lob Nor yesterday (Feb. 9th), and shall pass the month of February here, observing the migration of birds. In March we shall start for the town of Kirta, where our collections, loaded on ten camels, remain; while we are to pass the summer in the mountains of Northern Thibet, with the intention of re-entering Turkestan in the autumn. We have heard no news from Europe for twelve months, and have not seen a human being for three months."

The Marine Biological Station. — On the evening of May 13th Prof. Ray Lankester gave a lecture before the Society of Arts, John Street, Adelphi, on "The Value of a Marine Laboratory as a Means of Improving Sea Fisheries." Mr. E. L. Beckwith, Prime Warden of the Fishmongers' Company, presided.—The chairman stated that the daily supply of fish to

Billingsgate Market amounted to 500 tons. A ton of fish was about equal in weight to 28 sheep, so that 500 tons of fish were equivalent to a flock of 14,000 sheep.—Prof. Ray Lankester began by pointing out that while agriculture is in this country a refined branch of chemistry, our fishing industries were still barbaric; we recklessly seized the produce of the sea, regardless of the consequences of the method, the time, or the extent of our depredations. In point of fact we knew exceedingly little about the minute details of the life of marine animals; and he submitted that a laboratory on the sea-shore, provided with boat and fishermen, and having within its walls tanks for hatching eggs and watching sea fish and conveniences for the work of naturalists trained in making such observations, was the only way to meet the deficiency in our knowledge of the subject.—A considerable portion of the lecture was taken up with a rehearsal of the work done by the United States Fish Commission. Stress was laid upon Prof. Spencer Baird's attempt to cultivate sea fishes artificially, and the actual results in the production of Cod and Shad were stated. Experiments and observations similar to those carried out by the American Commission are to be undertaken by the Biological Association at Plymouth. The artificial cultivation of the Sole is to be at once taken in hand; and when something has been discovered about the spawning of the fish, and hatching accomplished, "vast numbers of young Soles" are to be turned into the Sound. Other fishes, of course, will be subjected to similar experiments. The Association recognises it as a first duty to obtain a "thorough-going knowledge of all the conditions" affecting the English Oyster. It will cast about in search of new and effective baits for line fishermen, and will do something towards cultivating on some system the familiar but much wasted Mussel and Limpet. A site for the Marine Laboratory has been obtained on Citadel Hill, Plymouth, by permission of the War authorities. The ground-floor will comprise large and small tanks, with a series of working rooms fitted with small tanks above. From reservoirs in the basement, replenished two or three times in the year, a stream of sea-water will be driven by pumping apparatus through the establishment. A steam launch is required, besides small boats. A resident superintendent, "who will be a thoroughly qualified naturalist," is to be appointed at a salary of £200 a year. The two or three attendants, constituting his staff, must be fishermen. Competent investigators, appointed from time to time to carry out particular inquiries, will be paid from special sources, and not at first from the general income of the Association. Naturalists, at their own expense, may attend at the laboratory for purposes of study. Important assistance is naturally expected from the local fleet of fishing-boats. This, as remarked by Prof. Ray Lankester, is a modest beginning. The funds do not allow of more at present. The estimate of ways and means was, on May 13th, a capital sum of £10,000, and an income, from annual subscribers, members, &c., reckoned at £500 a

year. On the following day the Fishmongers' Company made the scheme a grant of £2000. The full capital has yet, however, to be raised, the Council of the Association having only secured one-half the amount.

MAMMALIA.

Squirrels destroying the Eggs of *Picus major*.—As there are still some tender-hearted people who hesitate to believe in the egg-stealing propensity of the graceful and bright-eyed Squirrel, I think the following account of the destruction of a nest of *Picus major* may help to enlighten them:—In May of last year (1884) I found a nest of this bird in Hampshire in a dead Scotch fir, about thirty feet from the ground, containing a single fresh egg. This was lying on the usual flooring of chips, about nine inches below the entrance-hole, and in order to examine the nest without causing the birds to desert it I carefully cut a piece of the wood out of the side of the tree and replaced it, leaving the entrance untouched. A week afterwards I paid another visit to the tree, and to my surprise found the nest, which had been excavated to a depth of three or four inches more, empty. Having safely fastened my "window" again, I climbed up another dead tree about thirty yards distant, thinking perhaps the birds had taken fright at my first examination and were nesting elsewhere. My astonishment was great at finding, near the top of this other tree, wedged into a crack in the wood, an egg of *Picus major*, perfectly sound, except for a small tooth-mark in the side. I removed this egg, which was quite twenty feet above the ground, and descended to search for the shells of any other eggs there may have been, finding the remains of three lying close to the foot of the tree. Feeling sure as to the robbers, and thinking from the recent deepening of the nest that the birds might use it again, I got some tar and laid on a good coat of it round the trunk of the nest-tree. My plan succeeded admirably, for a week later I found there were four eggs in the nest, and the hen bird was sitting close on them. I have known Squirrels to remove the eggs from the nest of the Long-eared Owl and other species nesting in the pine-woods, but this is the first instance which has come to my knowledge of their interfering with those of a Woodpecker, and it is a marvellous thing how they could have got the eggs out of such a nest through a small hole without, apparently, breaking them. There is no doubt that they were the delinquents on this occasion, and I have registered a solemn vow to spare them no longer from any sentimental qualms of conscience. Perhaps the simple remedy adopted (the boughs of adjoining trees not affording communication with the nest-tree) may prove of service to lovers of bird-life.—S. G. REID, Capt. R.E.

Albino Field Vole. — I have lately received a pure albino Field Vole, *Arvicola agrestis*, which was killed in March last, near Horsham. This is

the first albino of this species I have heard of, although I have a cream-coloured one which was obtained last year (1884) in Leicestershire.—J. WHITAKER (Rainworth Lodge, Mansfield).

[Donovan has figured an albino of this species in his 'British Quadrupeds,' pl. 48; and another caught alive at East Bergholt, near Colchester, in November, 1872, is recorded in 'The Field' of November 30th, 1872. Mr. Borrer, of Cowfold, near Horsham, has in his collection a very pretty variety, procured some years ago in his neighbourhood. It is of a uniform clear buffy white.—ED.]

BIRDS.

Common and Honey Buzzards in Lancashire and Staffordshire.—

A male and female Common Buzzard, *Buteo vulgaris*, were taken in traps, in February last, on Bleasdale, in North Lancashire; and a female Honey Buzzard, *Pernis apivorus*, was shot by a keeper at Swynnerton, in Staffordshire, on September 17th last.—W. FITZHERBERT BROCKHOLES (Cloughton-on-Brock, Garstang).

The Species of British-killed Spotted Eagles determined.—In his article on the Spotted Eagle (Hist. Brit. Birds, vol. i., p. 107) Mr. Seebohm says—"In 'The Ibis' for 1877 Mr. Gurney refers the two Spotted Eagles killed in Cornwall, and recorded in 'The Zoologist' for 1861 to *Aquila clanga*, the Larger Spotted Eagle. In Dresser's 'Birds of Europe' this decision is quoted and endorsed. I believe, however, that I am in a position to prove that this is an erroneous one, and that it is the Lesser Spotted Eagle (to which species Dresser gives the name of *Aquila pomarina*, but which the great majority of ornithologists have called, and doubtless will still continue to call, *Aquila navia*) which has occurred in Britain." Mr. Seebohm then proceeds to argue from the measurements given by Mr. Gurney that the Cornish birds must be referable to *Aquila pomarina*, but he has never taken the trouble to examine either of the two specimens which have been obtained to test the question by a critical examination, as Mr. Gurney did before hazarding an opinion; and the consequence is that Mr. Seebohm has jumped to a wrong conclusion. When in Cornwall, last November, I visited Trebartha Hall, where the late Mr. Rodd's collection is now placed, purposely to see the specimen of the Spotted Eagle in that collection. There had recently been a fire at the Hall, and the collection had been taken out of the museum-room; but Mr. T. Rashleigh Rodd (the late Mr. E. H. Rodd's nephew), the present owner of the place, most courteously gave me full access to it, and afforded me every facility for examining the birds. The glass of the case containing the Spotted Eagle had been broken in the hurry and confusion of removal at the outbreak of the fire, so that I could thoroughly examine the bird; and can now state without hesitation that it is referable to *Aquila clanga*, and not *Aquila pomarina*. It is a very dark boldly-spotted bird, not having the

rufous nuchal patch, and closely resembles the profusely-spotted specimens so many of which have been sent to this country from India by Mr. W. E. Brooks and the late Mr. Andrew Anderson. I did not see the specimen shot at St. Columb when I visited the Truro Museum, and was told that it had been destroyed by moth; but Mr. Rodd assured me that it closely resembled the specimen in his collection in the large spots and profuse spotting, as also in the absence of the rufous nuchal patch, so that it may be safely inferred that it also was a specimen of *Aquila clanga*. — H. E. DRESSER (Topclyffe Grange, Farnborough, Kent).

Habits of Starlings.—Starlings usually flock here in great numbers in the autumn and commencement of the winter. In March it is well known that they are engaged in nesting-operations. In this neighbourhood these were arrested this year by the cold weather in the early part of April. To my astonishment they appeared again in large flocks, wending their way from 6.45 to 7.15 in a N.W. direction to their roosting-places, among fir-trees near some water on Col. Beme's property. The latter days of April were exceedingly warm, and during these few days the flocks were broken up; and one evening I noticed the passage of a great number in the same direction, all in pairs. The following evening not a single Starling was visible. The beginning of May there was another fall in the temperature, and again appeared large flocks of Starlings. I do not think that cold is entirely the cause of this phenomenon, for I have seen them in flocks during harvest, and I remember one instance in which a flock alighted upon the sheaves of a field of wheat; they only stayed there a short time, and then flew off to an arable field close at hand, where they busily employed themselves searching for insects. It was a grand sight to see a 14-acre field covered with them, and then to see them rise and perform those marvellous evolutions, which they execute in mass, before going to roost. I have a view from my sitting-room, looking a long way eastward into the country, from whence the flocks accumulate and pass under my observation. I believe the nesting of the Starling has this year been postponed, as at this time I generally see several on my lawn every morning.—C. R. BREE (Hill House, Long Melford).

Great Crested Grebe in Rutlandshire.—While watching the Moorhens and Coots on the water in Exton Park, near Oakham, on May 4th last, I observed amongst them an unusual bird, which on closer examination proved to be a male Great Crested Grebe. On further search I made out the female bird also, who, from her appearing suddenly in the open water, had probably dived off the nest, which I afterwards had the satisfaction of seeing at the edge of the reeds bordering the pond. On obtaining a boat and visiting the nest, it was found to contain two eggs, apparently recently laid, being both of a clear white. These were loosely covered with bits of

rushes and water-weed, according to the habit of this species. A few days later, on the 10th inst., the female was again seen sitting on the nest. The birds appeared not at all shy, and the nest was in a decidedly exposed situation, being easily discernible from a boat passing along the water. I have not had an opportunity of observing the nest since the date last-mentioned, but trust that these interesting birds may be successful in bringing off their brood. I am only aware of one previous instance of the Great Crested Grebe having been met with in Rutlandshire, when Mr. Evans, taxidermist, of Bourn, Lincolnshire, received, as he informs me, a specimen from the village of Great Casterton, in this county, some years since. There may, however, have been others of which I have not information.—GAINSBOROUGH (Exton Park, Oakham).

Bartram's Sandpiper, Little Bustard, and Hoopoe in Cornwall.—When at Penzance, in November last, I was told by Mr. Vingoe, the bird-stuffer, that a doctor at Truro possessed a specimen of Bartram's Sandpiper shot by his brother at the Lizard (as already recorded in 'The Zoologist'), but he could not remember the name of the doctor. When at Truro some days afterwards, I called on the various doctors resident in that city, and after one or two unavailing visits I found the bird in the possession of Dr. H. S. Leverton, 68, Lemon Street, who most courteously handed it over to me for examination; and I at once recognised it as my old friend *Bartramia longicauda*, which I had so often shot when in Texas. Dr. Leverton informed me that this specimen (which is remarkable as being a rather pale-coloured example) was shot by his brother, between two and three years ago, on the cliffs near Coverack, a village a few miles on the Truro side of the Lizard, and sent to him in the flesh. He was unable at first to make out what the bird was, but soon succeeded in identifying it by reference to Mr. Gould's work on the Birds of Great Britain. In the same room at Dr. Leverton's I saw in another case a very fine female of the Little Bustard, *Otis tetrax*, also killed in Cornwall; and in a letter subsequently received Dr. Leverton informed me that his brother saw a Hoopoe last summer on Goonhilly Downs, near St. Keverne, which bird was subsequently shot by the keeper at Trelowarren (Sir V. Vyvyan's). — H. E. DRESSER (Topclyffe Grange, Farnborough, Kent).

Variety of the Goldeneye.—Mr. Pratt, of Brighton, has recently mounted an interesting variety of the Goldeneye Duck, *Clangula glaucion*, having three white facial spots instead of two, the third one being on the chin. It is an adult male, and is the property of Mr. S. A. Walker, by whom it was shot at Stromness, Orkney, in December last. It is curious in slightly-pied birds how often the white feathers show themselves about the head—especially noticeable in Rooks, King Ouzels, and Blackbirds. On the other hand, there are some species very liable to be pied, as the

Sky Lark and Starling, in which this is not the case, they being more often than not pied in some other part of the body.—J. H. GURNEY, JUN. (Northrepps, Norwich).

Golden Eagle in Co. Leitrim.—On April 25th a bird of this species, in splendid plumage, was shot at Lough Rynn, County Leitrim, by Mr. Taylor, gamekeeper to Colonel Clements, in the act of taking away a young lamb. The Eagle measured five feet from tip to tip of wings.—WILLIAM J. HAMILTON (Castle Hamilton, Killashandra, Co. Cavan).

Curious Site for a Sparrow's Nest.—Some very curious sites for nests have been recorded from time to time in 'The Zoologist'; witness the case of a Titmouse nesting in one of the buffer-plungers of a railway carriage in daily use (Zool. 1884, p. 387), and a Sparrow building between the spokes of a wheel in frequent motion upon a gas-retort (Zool. 1883, p. 125). A still more remarkable case has just been noted. Prof. Flower informs me that during a recent visit to Woolwich Arsenal his attention was directed to a hen Sparrow sitting upon her nest containing five eggs in one of the axle-tree boxes of a 9-pounder bronze gun *which is fired twice daily*, at 1 p.m. and at 9.30 p.m.! One would have supposed that at the first discharge of the gun the bird would have deserted the nest for ever, and that the consequent recoil and vibration would have disturbed the eggs so materially as to render them unproductive. It is satisfactory, however, to learn from Col. Noble, R.A., that on May 16th five young Sparrows were hatched, and will probably be reared in due course.—J. E. HARTING.

Ornithological Notes from Somersetshire.—Although there has not been much to record, I send a few notes, mostly of the arrivals of migrants, which have been exceptionally late with us this spring; but, in the first place, I must mention a few very late stayers, which I suppose, owing to an exceptionally mild winter, did not leave us as usual in autumn. The first of these was a Landrail killed near Taunton on the 15th January, an adult bird, but slightly differing from those killed at the more usual time, the pale bluish grey over the eye and on the sides of the throat not being so visible as the feathers are much margined with pale brown. On the 2nd of February I got a note from Mr. Gatcombe, telling me he had seen a Green Sandpiper in a poulterer's shop at Bridgwater, which had been killed near that place shortly before. Curiously enough I got a note from the Rev. A. P. Morris, vicar of Britford, near Salisbury, in which he said his son had killed two Green Sandpipers during the Christmas holidays. As I do not think that either of these have been recorded it may be worth while to mention them. I did not hear any more about Green Sandpipers till a more legitimate time,—namely, the 22nd April,—when I found one at Mrs. Petherick's, birdstuffer, Taunton, doing duty as a Summer Snipe, *Totanus hypoleucus*; it had been killed at Wiveliscombe on the 16th.

and sent to Mrs. Petherick's as a Summer Snipe, which she considered it to be till I saw it. On the 11th February Mr. Coates, birdstuffer, Taunton, brought me a male Blackcap, which he said had been killed in a trap set for Blue Tits and baited with fat. It was in ordinary summer plumage, with a pure black cap, and showing no trace of the brown head of the female, which would probably have been the case had it assumed the brown cap of the female. Prof. Newton says that in winter some if not all the males lose their black caps and have their heads coloured like those of the females (Yarrell's Brit. Birds, 4th ed. vol. i. p. 422). I mention this for, besides Prof. Newton's note above referred to, the subject has been mooted in 'The Zoologist' for 1875 and 1876. I did not see or hear anything of the Chiffchaff till the 31st March, when one of my daughters told me she heard one, and the next day I saw one. I did not see a Swallow till the 16th April, when, as I was driving to Williton, I saw one or two at Torweston, near that place, and on our return late in the afternoon, I saw several about the house here, though there had been none when we left in the morning; these probably passed on, as after that first arrival they disappeared, and we did not see any more for a day or two. The first House Martin I saw in the street of the village on April 18th, and, last of the lot, the first Sand Martins on the 22nd, when I saw two or three about their old nest-holes in my quarry, rather reversing the usual order, as the Sand Martins are usually the first to arrive; they were rather scarce for the first few days, but now they are here in more than usual numbers, and the colony which frequents my quarry must be more than double its usual number this year. On the same day, April 22nd, my son told me he had seen a Swift at Williton, when drilling his volunteers; but I think Williton, though only ten miles off, is generally nearly a week before us—the occasional reports of summer migrants from that place in 'The Field,' I think, show the same thing. The Cuckoo did not make itself heard till April 24th, and even then was rather hoarse. I did not see a Redstart till the 27th, when I saw two in one of my orchards, and on the same day several Whitethroats made their appearance. I also saw a single Whinchat on a hedge by the road to Taunton, but not far from here; though the Stonechat is tolerably numerous, and not unfrequently remains throughout the winter, the Whinchat is by no means common, as I have not seen one here since May 1st, 1869, and they never remain to breed; in other parts of the county, especially about Clevedon, I have seen Whinchats tolerably numerous, and evidently breeding. None of us saw a Blackcap till the 1st of May, but I suppose they escaped observation, as one of my daughters found a Blackcap's nest with eggs on the 6th. I saw the first Yellow Wagtail on May 1st. As early as the 19th January the Red-legged Gulls, *Larus ridibundus*, in confinement began to show their dark heads, and by the 24th February one of them had completed the change and the

others nearly so, though at that time neither the Ruffs nor the Black-tailed Godwits had begun to show any change. On the 21st April I was told that the Peewits near Minehead had eggs hard-set; mine, however,—in the same place as the Ruffs and Godwits,—had not shown any signs of change to summer plumage, and indeed on the 6th May only one of them has assumed the black throat of the breeding-season, though the Ruffs and Black-tailed Godwits have quite completed their breeding-plumage, and the white mark on the fore part of the throat of a pair of Oystercatchers, in the same place, is rapidly becoming invisible. Two Knots, however, in the same place, show no inclination to change; whether they will do so when the weather gets warmer I cannot say—at present there is a miserably cold wet N.E. wind. On the 5th April, when out hunting at Halswell I saw the Herons again on their nests, though the keeper told me he thought there were not quite so many nests as last year, for, though none of their nesting-trees had been felled, one or two of the taller trees which they were in the habit of using as look-out places had been cut down in thinning the plantation, and the Herons did not approve of it. On the 17th we were there again, and the greater part of the Herons were sitting hard, but the keeper said he did not think any young ones had been hatched. One pair of the tame Herring Gulls have two eggs, and the Herring Gull and Lesser Black-back have paired again and made their nest, but there is no egg yet, and two pairs of Pink-footed Geese are sitting.—CECIL SMITH (Bishops Lydeard, Taunton).

FISHES.

The Basking Shark.—In 'The Zoologist' for July, 1884, Mr. Cornish recorded the capture of a female Basking Shark, 9 ft. 4 in. long, which was "gorged to repletion with Hake and Mackerel," remarking, that "the teeth of this specimen were conical and recurved, about half-an-inch long in the longest," in two rows, except in the middle of the lower jaw, where there were three. This observation, so entirely at variance with my remarks (Brit. and Irish Fish.), published two months previously, rather surprised me, for I had asserted that it is not a voracious fish, and (judging from the small size of its teeth and the large size of its gill-openings, which permit the passage of a great amount of water, as well as the presence of a peculiar sifting apparatus to detain minute structures) that I believed it fed on small animals. But not having examined a specimen in the flesh, I was unwilling to offer any reply at the time in your column. When at Mevagissey, in Cornwall, this month, I was told of some Sharks which had been seen among the Mackerel, many of which latter fish had been observed bitten in two, and the fishermen supposed these Sharks were the culprits. On the morning of May 7th I received, at Cheltenham, a specimen (by rail) of a female, 11 ft. long, captured the previous morning off the "Deadmans," and which had been secured for me by Mr. Dunn. Being of the same sex

as Mr. Cornish's example and $1\frac{1}{2}$ ft. longer, the first investigation I made was naturally into the size of its teeth, and the longest in either jaw was 0.09 of an inch, or merely $\frac{1}{11}$ ths of the length of those in the smaller Penzance specimen. These teeth also were not in rows parallel to the edge of the jaw, but passing obliquely over that bone. An excellent figure of a single tooth will be found in Prof. Turner's paper in the 'Journal of Anatomy and Physiology' for April, 1880. It is evident that this species of Shark has no teeth anything like "half an inch long." Its stomach was gorged with "red stuff like bruised crabs or the roe of the sea-urchin," as described by Low and others, and which on being placed under the microscope was seen to consist principally of *Amphipoda* and *Copepoda*, among which was a small piece of sea-weed, possibly swallowed inadvertently. Two quarts of food then practically consisted of small sessile-eyed Crustacea, and no vegetable substance. The Penzance fish was possibly a Porbeagle, *Lamna cornubica*, a fierce and destructive species, by no means rare off the coast of Cornwall. The Basking Shark may be killed for its intrinsic value as an oil-giver, or for the damage it does in disturbing fisheries, or for consuming the minute crustaceans on which some of our best table-fish subsist; but I submit that we have no evidence of its devouring any fishes, especially such as are suitable for the market, while its teeth conclusively demonstrate that they are not adapted for such a purpose.—FRANCIS DAY (Cheltenham).

Food of Sea Fishes.—For a period of more than twenty years I have noted that the surface of the sea off the coast of Cornwall in spring assumes at certain times a deep olive colour, which in favourable seasons extends full twenty miles from land. Our fishermen call it "cowshiny water," no doubt on account of the similarity which it presents to the excrement of the cow when diluted. On looking carefully into the sea I found it full of olive-coloured jelly-like forms, which for some time I thought were small *Medusæ*, but under the glass they were found to be globules of olive matter, varying in size from ordinary gunshot to that of small garden peas. They permeated the water for many yards in depth; their numbers were as incalculable as the sands on the shore. On further observation it was noted that all our surface-feeding fishes were exceedingly fond of them as food, and that the stomachs of Mackerel, Herring, and Pilchard were often quite distended with them. Moreover, the success of the inshore Mackerel-fishery on this coast, in the months of March and April, seems to depend much on the quantity of this food which may then exist. Further investigation showed that the existence of these globules in the sea depends entirely on the occurrence of showers during the months above mentioned. If there is no rain there will certainly be no olive-colouring in the sea and no olive globules. The earliest date at which I have noticed them was about March 10th, and the latest about May 20th. By those professionally interested in our fisheries the first change of sea from blue to olive is more

anxiously looked for than is the first primrose by the farmer, the immediate results being so important. The germs of these olive globules, if floating in the sea prior to the advent of rain, must be extremely minute, since they do not give a tinge to the water. Up to this point I could go no further for years, and could only watch the rain and the change. But last summer, while scanning the sea after some heavy showers, I noticed that close to land the water had turned to a deep green colour, caused by quantities of green globules much resembling the olive-coloured ones of spring. It then occurred to me they were nothing more than the spores of sea-weeds, the latter being really the seeds of green Algæ (*Chlorospermeæ*). I believe then I am correct in saying that these myriads of olive globules which furnish such abundant food to the surface-feeding fishes, and which colour the sea in the manner described, are nothing more than the fully developed spores or seeds of the *Melanospermeæ*, or olive sea-weed. The number of spores thrown off in one season by a single full-grown plant must be prodigious. The last I observed was a *Fucus serratus*, and the figures representing them could not be less than two millions. What our scientific authorities have to say on the matter I do not know; the books I have on sea-weeds contain no allusion to rain-water playing any part in the development of the spores. But it now seems probable that there can be no fructification of the olive and green sea-weeds without the aid of genial showers in spring and summer.—MATTHIAS DUNN (Mevagissey).

Ova of the Ling.—About the middle of April last a Ling, *Molva vulgaris*, was landed at Mevagissey with the spawn running freely from it. As the fish was only just dead, and good strong sea-water was at hand, I at once procured a pailful, and put in some of the spawn. It all floated on the surface of the water, each egg free and distinct from its fellow, without any appearance of any adhesive matter around them. On dipping some up into a hand-glass all the eggs looked bright and transparent, although when a quantity were driven together they had a grey tinge. On one side of every ova, just under the sac or egg-case, there was a minute speck of clear matter, and this was uppermost in all the ova when floating. As all the *Gadida*, to which family the Ling belongs, when in the act of spawning part with the oil in the liver, it would be interesting to know whether these bright globules in the eggs are composed of oil, one of its uses being to keep the matter floating on the surface of the sea. Later in the day I found a male Ling with the milt running free; this I also found floated on the surface of the water.—MATTHIAS DUNN (Mevagissey).

ECHINODERMATA.

Method of Preserving the Colour of Starfishes.—The Starfish Gallery of the British Museum (Natural History) has received an addition which, though it is only of specimens of common British species, is of

interest and importance. The specimens, which are examples of *Asterias rubens* and *Solaster papposus*, were killed by immersion in boiling water, and have, especially the latter, retained their original coloration. This method is so simple, and appears to be so successful, that we commend it to our readers; it will, no doubt, be as efficacious with foreign as with English species, and may be an important factor in improving the exhibited series of Echinoderms in the National Collection. We hope that Mr. Sibert Saunders, of Whitstable, will have many imitators.

SCIENTIFIC SOCIETIES.

ZOOLOGICAL SOCIETY OF LONDON.

April 21, 1885. — Prof. W. H. FLOWER, LL.D., F.R.S., President, in the chair.

The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of March, and called attention to a female Roan Kangaroo, *Macropus erubescens*, being the third specimen of this Kangaroo acquired by the Society, and the first of the female sex: also to six Wattled Starlings, *Dilophus carunculatus*, from South Africa, and two Striated Colies, *Colius striatus*, both species being new to the collection.

Mr. Sclater exhibited and remarked on a pair of Pheasants from Bala Murghab, Northern Afghanistan, belonging to H.R.H. the Prince of Wales.

Mr. G. E. Dobson exhibited some skulls of *Crocidura aranea*, and pointed out that they possessed supernumerary teeth (premolars) in the upper jaw.

The Secretary exhibited, on behalf of M. George Claraz, an egg of Darwin's Rhea; and read some notes by M. Claraz on the habits and distribution of this Rhea.

Mr. G. A. Boulenger exhibited a specimen of a Brazilian Snake which had partly swallowed an Amphisbænoid Lizard. The Lizard had in its turn partly eaten its way through the body of the Snake.

A communication was read from Sir Richard Owen, containing remarks on the structure of the heart in *Ornithorhynchus* and in *Apteryx*.

Mr. Oldfield Thomas read a paper on the characters of the different forms of the *Echidna* of Australia, Tasmania, and New Guinea, all of which he was inclined to refer to one varying species.

Dr. St. George Mivart read a memoir on the anatomy, classification, and distribution of the Arctoidean Carnivorous Mammals. The author, after briefly noticing the papers of other naturalists who have of late years treated of this subject, described the main facts concerning the anatomy of the various Arctoid genera, especially as regards their osteology and dentition, and gave detailed comparisons of the proportions of the various

parts of the skeleton, comparing them with those of the *Æluroids* and *Cynoids*.

Dr. F. H. H. Guillemard read the second part of his report on the collection of birds made during the voyage of the yacht 'Marchesa.' The present paper gave an account of the birds collected in Borneo. It also contained notes on some birds obtained on the island of Cagayan Sula, on the north-east coast of Borneo.

May 5, 1885.—Prof. ALFRED NEWTON, F.R.S., Vice-President, in the chair.

The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of April, and called special attention to a pair of Rhinoceroses, apparently referable to the Sumatran species, *Rhinoceros sumatrensis*; to a Tibetan Wild Ass, *Equus hemionus*, received on deposit; and to two Gouldian Grass Finches, *Poephila gouldiæ*, presented by Mr. C. N. Rosenfeld.

A communication was read from Mr. Jean Stolzmann, containing observations on the theory of sexual dimorphism.

Mr. J. Bland Sutton read a paper on hypertrophy and its value in evolution, in which he attempted to show that material changes in structure might be the result of what was originally a pathological condition.

Mr. E. T. Newton read a paper on the remains of a gigantic species of bird, *Gastornis Klasseni*, which had been obtained by Mr. H. M. Klaassen from the "Woolwich and Reading Beds" of the lower Eocene series. The author observed that these fossils proved that in early Eocene times England was inhabited by a race of birds which equalled in their proportions some of the more massive forms of the New-Zealand Moas.

A communication was read from Mr. R. B. Sharpe, containing the description of a new species of Hornbill from the island of Palawan, which he proposed to name *Anthracoceros lemprieri*.

Prof. E. Ray Lankester read some notes on the right cardiac valve of the specimens of *Apteryx* dissected by Sir Richard Owen in 1841.

A communication was read from Lieut.-Col. C. Swinhoe, being the third of his series of papers on the Lepidoptera of Bombay and the Deccan. The present paper treated of the second portion of the Heterocera.

A communication was read from Dr. St. George Mivart, containing a correction of a statement concerning the structure of *Viverricula* contained in a former paper.

May 19, 1885.—F. DU CANE GODMAN, Esq., F.R.S., in the chair.

A letter was read from the Rev. G. H. R. Fisk, respecting the capture of a Sea-Snake amongst the rocks at the entrance to Table Bay, which he believed to be referable to *Pelamis bicolor*.

A letter was read from Mr. B. Crowther, stating that he was about to send the Society a pair of Duckbills, *Ornithorhynchus paradoxus*, and giving some instructions as to the treatment of these animals in captivity.

Mr. F. Day exhibited and made remarks on a curious specimen illustrative of an extensive injury to the intestines of a Trout, and its subsequent recovery therefrom.

Mr. Day also exhibited a piece of the sifting-apparatus of the Basking Shark, together with specimens of the food upon which it lives; and an example of the Vendace taken in Derwentwater Lake.

Mr. Osbert H. Howarth exhibited a specimen of coral of the genus *Dendrophyllia* attached to a brown stoneware bottle, which had been dredged up in the Atlantic, off Madeira, at a depth of about 15 fathoms.

A communication was read from Prof. J. von Haast on *Dinornis oweni*, in which the author gave a detailed description of the bones of this recently discovered new species of the extinct wingless birds of New Zealand, which was remarkable for its small size.

A communication was read from Dr. St. George Mivart, containing notes on the genetic affinities of the group of Pinnipeds.

Dr. F. H. H. Guillemard read the third part of his report on the collection of birds formed during the voyage of the yacht 'Marchesa.' The paper dealt with the birds obtained on the Island of Sumbawa, a locality hitherto almost unknown to ornithologists. During the 'Marchesa's' short visit examples of thirty-nine species were collected. Of these, two (*Turnix powelli* and *Zosterops sumbavensis*) were new to Science. The remaining species had been previously recorded from islands to the eastward or westward in the same group.

A communication was read from Dr. Hubrecht, containing the description of a Pennatulid obtained by Capt. St. John in the Japanese Sea at a depth of 71 fathoms. A careful examination of the specimen in question induced the author to assign it to a new genus and species, which he proposed to name *Echinoptilus mackintoshii*.

Mr. Herbert Druce read a paper on some new species of Lepidoptera-Heterocera, founded on specimens obtained by the late Mr. C. Buckley in Ecuador, to which were added descriptions of some recent acquisitions of the same group from various other localities.

Mr. F. D. Godman read descriptions of the Lepidoptera collected by Mr. H. H. Johnstone on Kilimandjaro. The collection contained examples of twenty-one species of the Rhopalocera, and six of Heterocera. Of the Rhopalocera the author described three species as new. — P. L. SCLATER, Secretary.

